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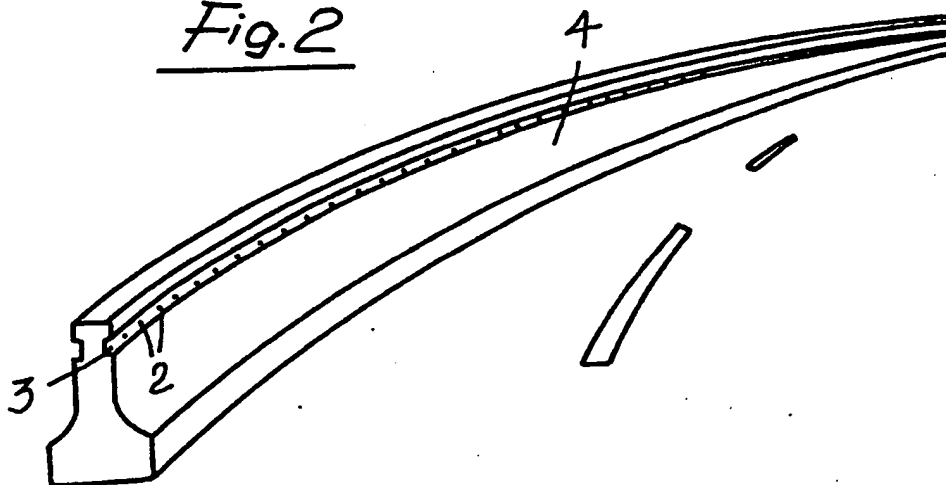
(54) Road signalling devices for facilitating the driving of vehicles in foggy weather.

(57) A signalling arrangement for indicating the path of a road in conditions of impaired visibility, in particular in fog, comprises series of roadside support elements (1) with fibre optic illumination. Said supports can be vertical display panels (5) on posts mounted on top of the guard wall (4) or of the guardrail structure, with the light-emitting ends of the optical fibres defining e.g. a directional chevron mark or part thereof; in a bend a plurality of such panels (5) may be positioned in a staggered array so as

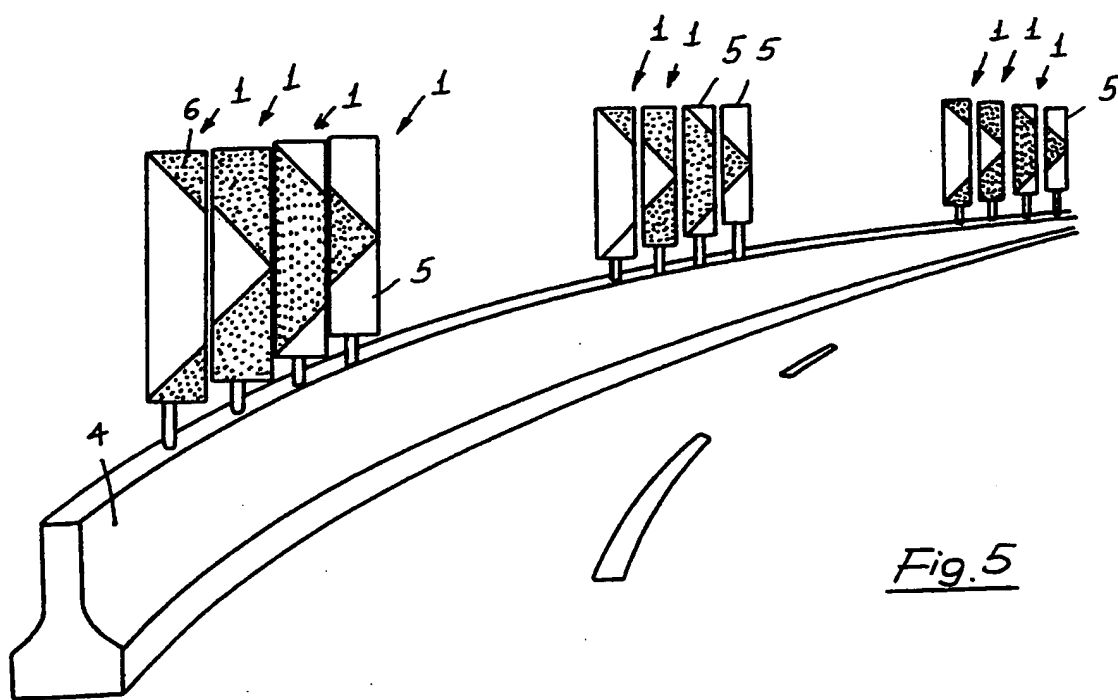
together to display a directional arrow. Alternatively, a tubular element (3) from which project a continuous series of spaced support elements (1) with spot fibre optic illumination (2) may be recessed into the flank of the guard wall (4).

To warn of the risk of a front-end pile-up, apparatus, e.g. induction coils, spaced along the road and adapted to detect stopped vehicles, may cause the up-stream fibre optic lights to flash.

Fig.2



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## BACKGROUND OF THE INVENTION

The present invention relates to road signalling devices, for facilitating the driving of vehicles in poor visibility conditions, in particular in foggy weather.

As is known, one of the most important problems to be solved in the vehicle traffic field is that of properly indicating the road path, by means of suitable light signalling devices, mainly on speedways and under poor visibility conditions.

Known devices designed for solving the above mentioned problems have not been found fully satisfactory since these devices are substantially based on the concept of assuring a very high illumination level which is obtained by light sources mounted on posts or lighting towers.

This system, on the other hand, is very expensive, both because of its installation cost and because of its maintenance cost: in fact, it has a very great power consumption.

The above mentioned problems are particularly serious in foggy weather since, under these conditions, a driver can hardly follow the road path.

In this connection it should be pointed out that a high illumination from the top is susceptible to further aggravate the poor visibility problem.

For solving the problem of providing sufficient driving capabilities in foggy weather light refracting devices have been also proposed: however, these devices have been found also unsatisfactory.

## SUMMARY OF THE INVENTION

Accordingly, the aim of the present invention is to overcome the above mentioned drawbacks, by providing road signalling devices which are so designed and arranged as to substantially facilitate the driving of vehicles under foggy weather conditions.

Within the scope of the above aim, a main object of the present invention is to provide road signalling devices which are adapted to pre-signal to coming vehicle drivers the presence of vehicles queues in a rest condition on the road track and susceptible to cause, under foggy weather conditions, the so-called "chain" accidents.

Another object of the present invention is to provide road signalling devices which are very reliable and safe in operation.

Yet another object of the present invention is to provide road signalling devices which can be easily made starting from easily available materials and

elements and which, moreover, are very competitive from a mere economic and maintenance standpoint.

According to one aspect of the present invention, the above aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by road signalling devices, particularly designed for indicating a road path or track, characterized in that said signalling devices essentially comprise support elements adapted to support the end portions of one or more optical fibres and adapted to be modularly applied at given positions, so as to continuously indicate the path of a given road track.

## BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the road signalling devices according to the present invention, will become more apparent from the following detailed description of some preferred embodiments thereof which are illustrated, by way of an indicative but not limitative example, in the figures of the accompanying drawings, where:

Figure 1 is a perspective view illustrating a continuous spot signalling devices for signalling rectilinear road tracks;

Figure 2 is another perspective view illustrating a road signalling device designed for signalling curves road tracks;

Figure 3 shows a rectilinear road track therewith there are associated vertically extending signalling devices according to the invention;

Figures 4 and 5 show a curved road track therewith there are associated two different types of road signalling devices according to the invention;

Figures 6, 7 and 9 show corresponding types of possible road signalling devices according to the invention;

Figure 8 shows a signalling device which has been specifically designed for signalling a road curved portion, and made by mutually assembling several signalling panels; and

Figure 10 is a detail view showing a plurality of supporting elements for supporting the end portions of corresponding optical fibres, according to the arrangements of figures 1 and 2.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the figures of the accompanying drawings, the road signalling devices according to the invention, which have been specifically designed for facilitating the driving of vehicles on roads and speedways, under poor visibility conditions, and mainly in foggy weather, comprise a supporting element, overallly indicated at the reference number 1.

This supporting element, which is so oriented as to be clearly visible on the road track, has applied, on a surface thereof, the end portion of one or more optical fibres 2.

The mentioned supporting elements (figures 1, 2 and 10) made with suitable shapes and sizes, can be installed, at even spacings, on a tubular element 3 which can be directly applied on a traffic island 4 having a corresponding longitudinal housing.

This constructional embodiment is adapted to provide a continuous series of signalling devices, both for a rectilinear road track and for a curved road track.

Alternatively (as shown in figures 3, 4 and 5), the support element can comprise a panel 5, of any suitable shape provided that it conforms to the road code regulations.

On at least a surface portion of this panel there are coupled the end portions of a plurality of optical fibres 2 which are so arranged as to define a traffic sign.

According to a preferred embodiment, it is provided that the optical fibre sign, which can be clearly seen at a distance, will not be seen as the visual angle is greater than  $12^\circ$ , so as to prevent any glare phenomena from occurring.

Advantageously, the bottom of the panel 5 comprises a light refracting film 6 adapted to improve the visual efficiency.

In this connection it should be pointed out that optical fibre signalling devices have a high brilliancy thereby they can be clearly seen even under highly foggy weather so as to provide a motor vehicle driver with a perfect indication of the road path.

In cooperation with the subject signalling devices, moreover, it is possible to provide for the installation of special apparatus adapted to detect motor vehicles at rest conditions and to drive, through suitable interfacing apparatus, the illuminating lamps of the optical fibres.

These apparatus, in particular, can comprise induction coils, of the easily commercially available type, which will be installed, at even spacings, along the road track.

Thus, if along the road several motor vehicles are in a rest condition, it will be possible to cause the light signalling devices to be switched on and off, for a given duration, so as to supply the driver of a coming motor vehicle with information related to the stopped motor vehicles present on the road.

Thus, the drivers of the coming motor vehicles will be timely informed about a dangerous queue of motor vehicles on the road.

It should be apparent that the subject signalling devices should be made in conformity with the enforcing road code rules and could be easily changed according to requirements.

In particular, as it is schematically shown in figures 5 and 8, the signalling device can be made by assembling several signalling panels which can be arranged both in an adjoining relationship and in an offset relationship so as to be easily seen as a single signalling sign as they are seen from a distance.

Moreover, the application of a light refracting film bottom allows to greatly increase the efficiency of the light signalling device.

Moreover, a brilliancy control system can be further provided for adapting the brilliancy of the optical fibres depending on the environment light, thereby overcoming any glare phenomena.

From the above disclosure it should be apparent that the invention fully achieves the intended aim and objects.

While the invention has been disclosed and illustrated with reference to preferred embodiments thereof, it should be apparent that the disclosed embodiments are susceptible to several modifications and variations, all of which will come within the scope and spirit of the appended claims.

## Claims

1. A road signalling device, particularly designed for facilitating the driving of motor vehicles under poor visibility conditions, in particular in foggy weather, characterized in that said device essentially comprises a support element adapted to support the end portion of one or more optical fibres and adapted to be modularly applied at given positions so as to continuously define the path of a given road track.

2. A road signalling device according to claim 1, characterized in that said device comprises a panel body including optical fibre light signalling elements, adapted to provide an indication in conformity with an enforcing road code.

3. A device according to one or more of the preceding claims, characterized in that said optical fibres are adapted to emit a highly directional light signal so as to be visible exclusively with a visual

angle less than  $12^\circ$ .

4. A device according to one or more of the preceding claims, characterized in that said device comprises a plurality of adjoining panel bodies.

5. A device according to one or more of the preceding claims, characterized in that said device comprises a plurality of spaced and offset panel bodies which can be seen from a distance as a single signalling element.

6. A device according to one or more of the preceding claims, characterized in that said device comprises a light refracting bottom.

7. A device according to one or more of the preceding claims, characterized in that said device comprises light sources adapted to emit light in an intermittent way, said sources being controlled by apparatus adapted to detect motor vehicles in a rest condition.

8. A road signalling device according to one or more of the preceding claims, characterized in that said device further comprises light adjusting apparatus which operate depending on the environment light for adjusting the brilliancy of said optical fibres.

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Fig. 1

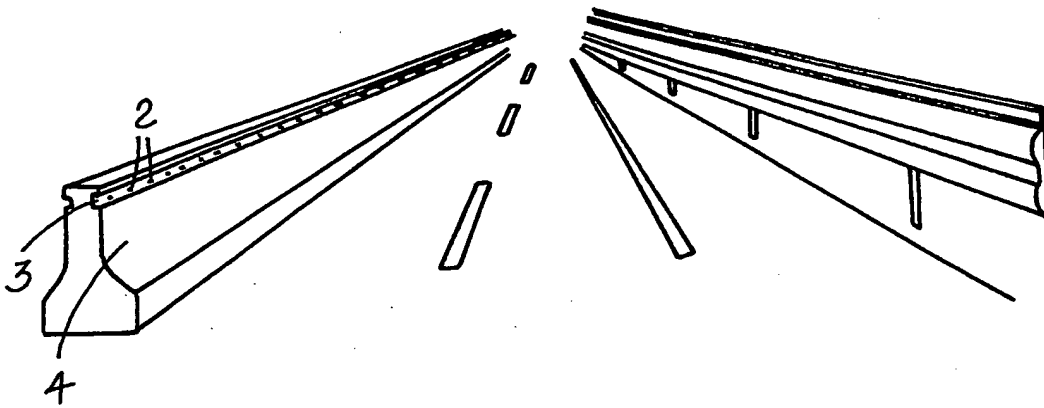
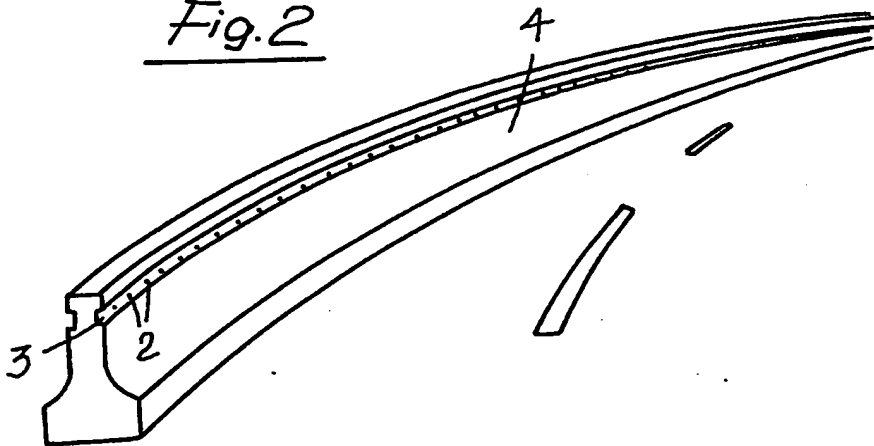
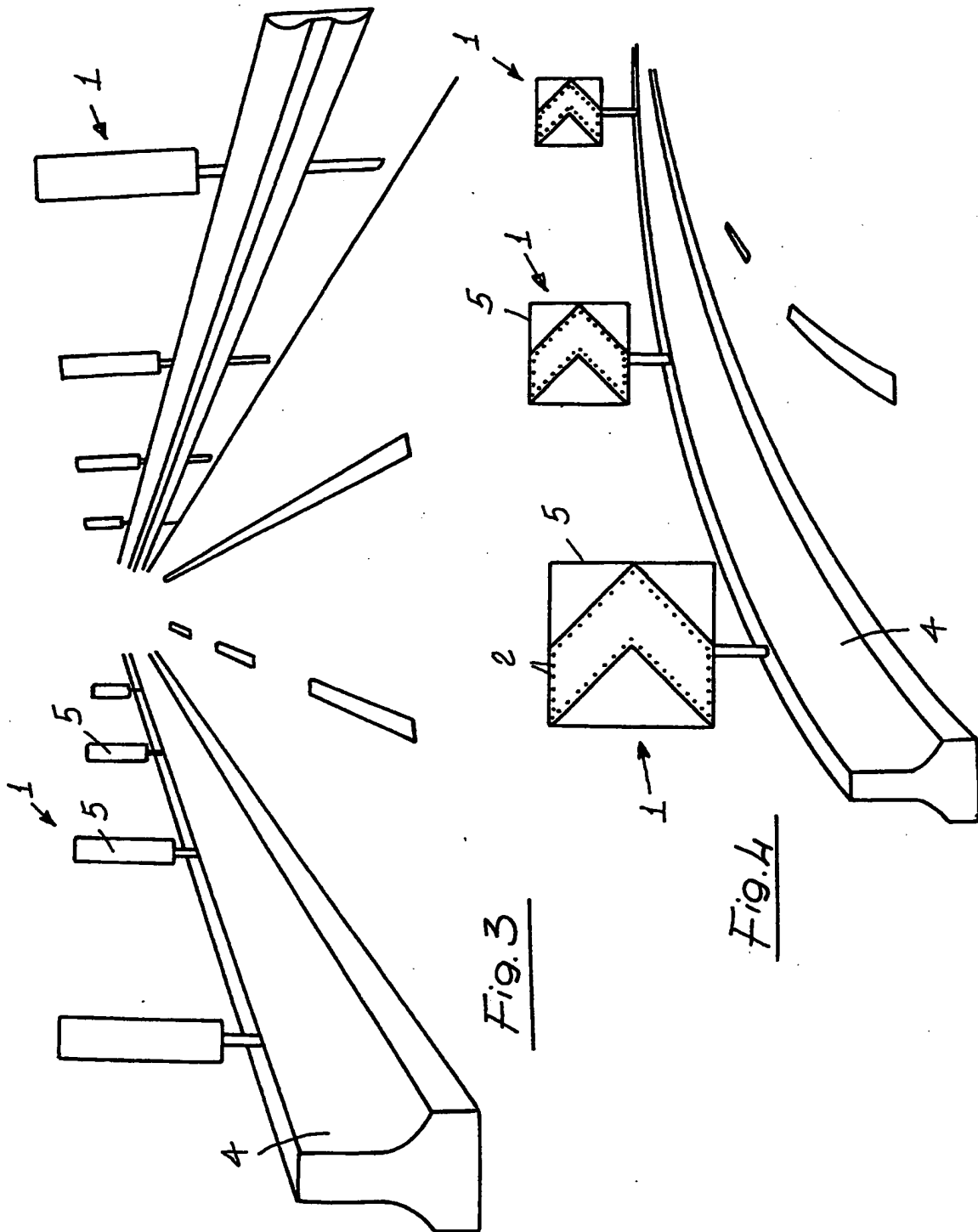
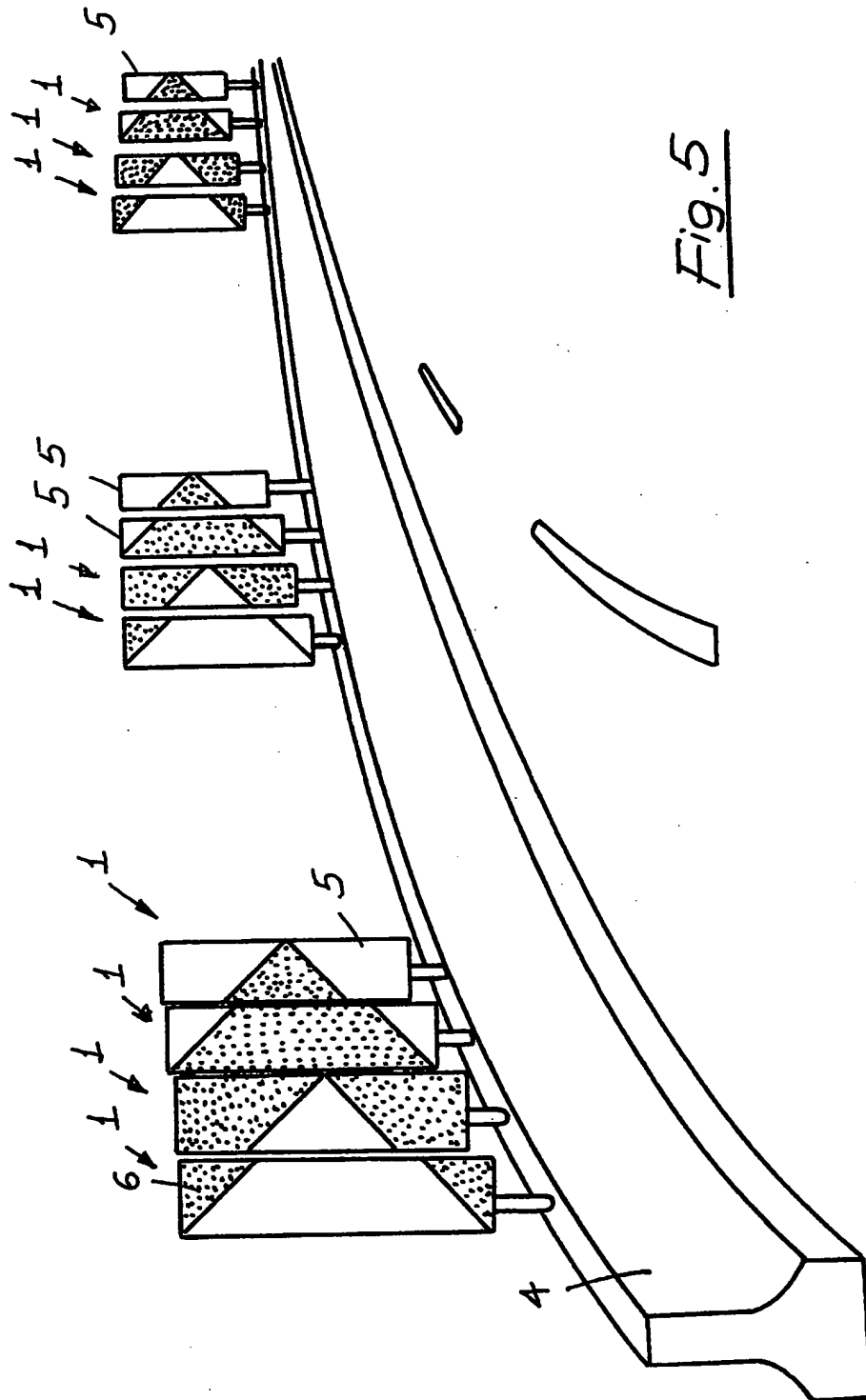


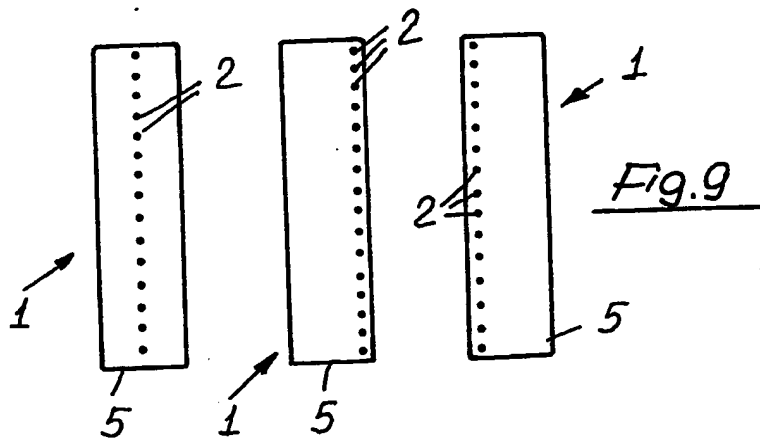
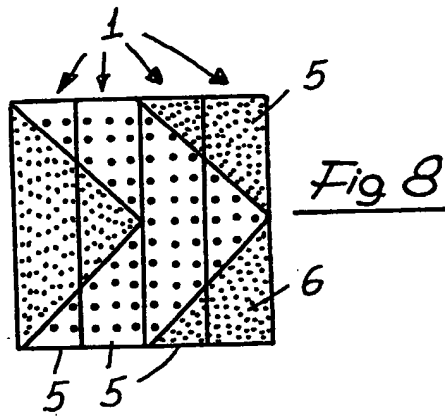
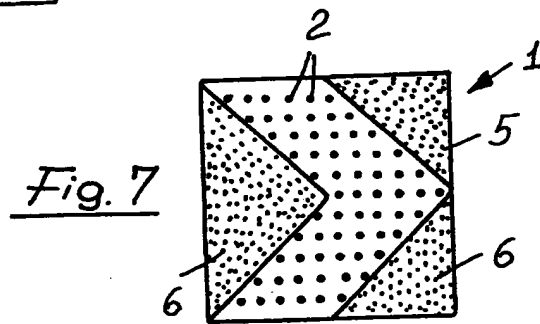
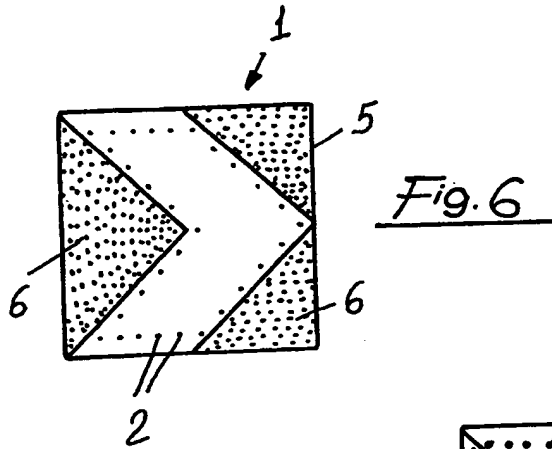
Fig. 2

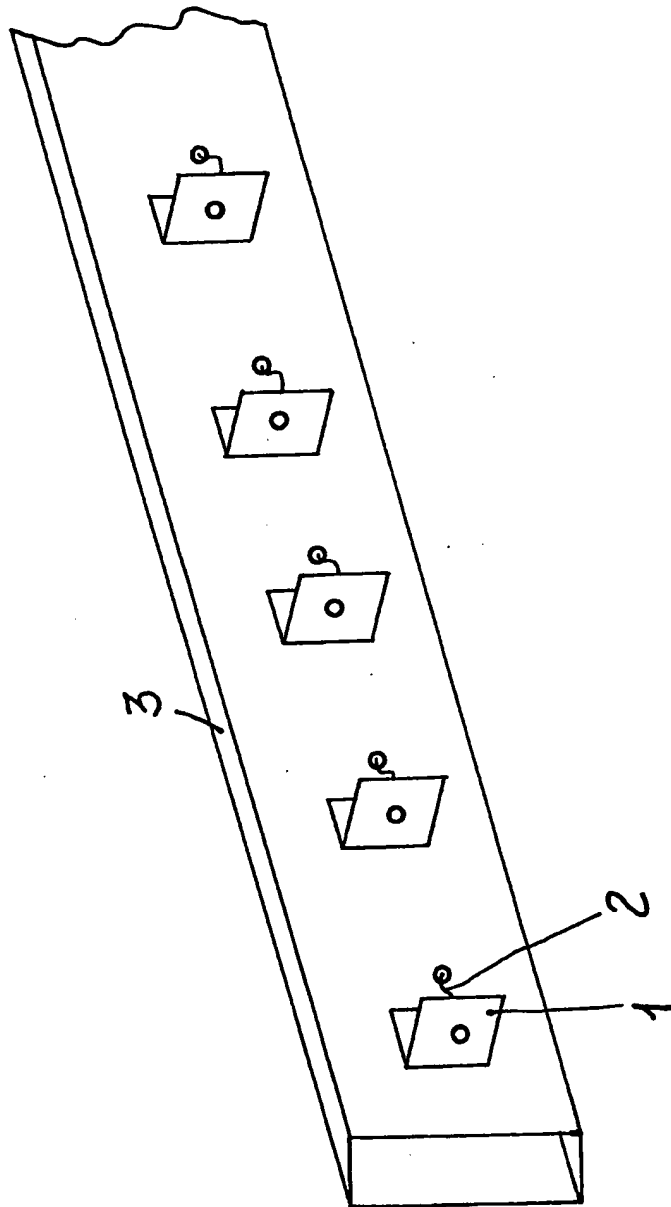












*FIG. 10*



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# EUROPEAN SEARCH REPORT

Application Number

EP 90 83 0074

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	WO-A-8 807 560 (THE SECRETARY OF STATE FOR TRANSPORT IN HER BRITANNIC MAJESTY'S GOVERNMENT) * Page 1, lines 2-4,7-12,18-20,23-35; page 2, lines 1-4,17-21,30-32,34-36; page 3, lines 24-28; page 4, lines 5,6; figures 1,2 *	1	E 01 F 9/10 E 01 F 15/00 F 21 V 8/00 G 08 G 1/16 G 09 F 13/00 G 09 F 19/22
Y	---	4	
Y	GB-A-2 128 664 (SHO-BOND CONSTRUCTION et al.) * Page 1, lines 3-6,80-87,93,94,96-99,106-111; page 2, lines 7-11,20-22; figures 1-3,7,8 *	4	
A	---	1	
X	FR-A-2 466 819 (PARIENTE) * Page 1, lines 1-7,14-32; page 2, lines 3-6,22-24; page 3, lines 7-14,16-19,23-35; page 4, lines 7-14; page 5, lines 2-4,10-13,23-26,29-32; figures 1-3 *	1,2,6	
Y	---	3,7	
A	ROUTE ET TRAFIC, vol. 67, no. 3, March 1981, pages 66-69, Zürich, CH; H.P. LINDENMANN: "Verbesserung der optischen Führung nachts in Kurven durch betriebliche und bauliche Massnahmen" * Page 68, figure 4; page 69, figure 7 *	1	E 01 F G 08 G G 09 F
	---	-/-	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14-05-1990	Examiner SCHUMAN R.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons * : member of the same patent family, corresponding document			



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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	FR-A-2 501 884 (JEAN NEUHAUS SA) * Page 1, lines 3-16; page 2, lines 10-24,30-34; page 3, lines 12-22; page 5, lines 18,19; page 6, lines 9-16,32-97; page 7, lines 1,2,17,18,24-27; figure 3 *	3	
Y	CH-A- 553 460 (GIRSBERGER) * Column 2, lines 31-36,52-62; column 4, lines 4-21; column 5, lines 39-41; column 7, lines 52,53; column 10, lines 34-41 *	7	
X	WO-A-8 704 230 (THE SECRETARY OF STATE FOR TRANSPORT IN HER BRITANNIC MAJESTY'S GOVERNMENT) * Page 1, lines 2-4; page 2, lines 3-8; page 3, lines 12-21; page 5, lines 15,16,24-27; figure 1 *	1	
A	---	2	
X	GB-A-2 076 042 (REDLAND AUTOMATION) * Page 1, lines 44-51,54-57,100-107,113-119; page 2, lines 13-17; page 3, lines 11-18; figures 2,3 *	1	
A	---	2,7	
A	GB-A-2 157 470 (SMITH) * Page 1, lines 5-7,23-27,32-43,45,46,82-86,88-95; page 2, lines 31-37,43-48,69-73; figures 1,2 *	1,2,4	
---		-/-	
The present search report has been drawn up for all claims			
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A	GB-A-2 159 559 (BRIGGS) * Page 1, lines 24-36,56-65; page 2, lines 22-43; figure 4 *	1-3	
A	GB-A-2 183 698 (GLASDON) * Page 1, lines 5-12,15-20,96-99; page 20-28; figure 1 *	4	
A	FR-A- 738 484 (JUDLIN) * Page 1, lines 1-17,50-53,55-62; page 2, lines 20-22,26-36,42-44; figures 1-3 *	5	
A	FR-A- 911 490 (BLONDEL) * Page 1, lines 1-4,19,20,25,26,36-38; page 2, lines 18-22,38-47,57-59,73-76; figures 3,4,6 *	5	
A	DE-A-3 031 246 (FRITTEL) * Page 4, lines 1-5; page 5, lines 16-18; page 6, lines 9-12,16-18,20-27; page 7, lines 1-5,9-15,17,18; page 10, lines 3-5 *	1,2,7	
A	US-A-3 317 189 (RUBENSTEIN) * Column 1, lines 15-17,46-49; column 6, lines 11-15,19-22 *	1	
A	US-A-3 585 585 (GROSZ) * Column 1, lines 4-19,62-64; column 2, lines 31-38,47,48,53-55; figure 1 *	1,7	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	FR-A-1 477 716 (L'ECLAIRAGE DES VEHICULES SUR RAILS) * Page 1, left-hand column, lines 15-22,27-31; page 1, right-hand column, lines 1-10; page 2, left-hand column, lines 32-43,59-62; page 3, right-hand column, lines 3-19; page 5, left-hand column, lines 19-22,24-30; figures 1,2 *	7,8  /	
A	DE-A-2 816 718 (HALM)		
A	DE-U-8 713 460 (REIFF-BETON-ROHR)		
A	DE-A-2 312 527 (MEHRINGER)		
A	CH-A- 385 271 (SCHWEIZERISCHE ALUMINIUM AG)		
A	US-A-4 772 155 (DINITZ)		
A	FR-A-2 451 606 (WOLFSON)		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-3 214 142 (BROWN)		
The present search report has been drawn up for all claims			
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